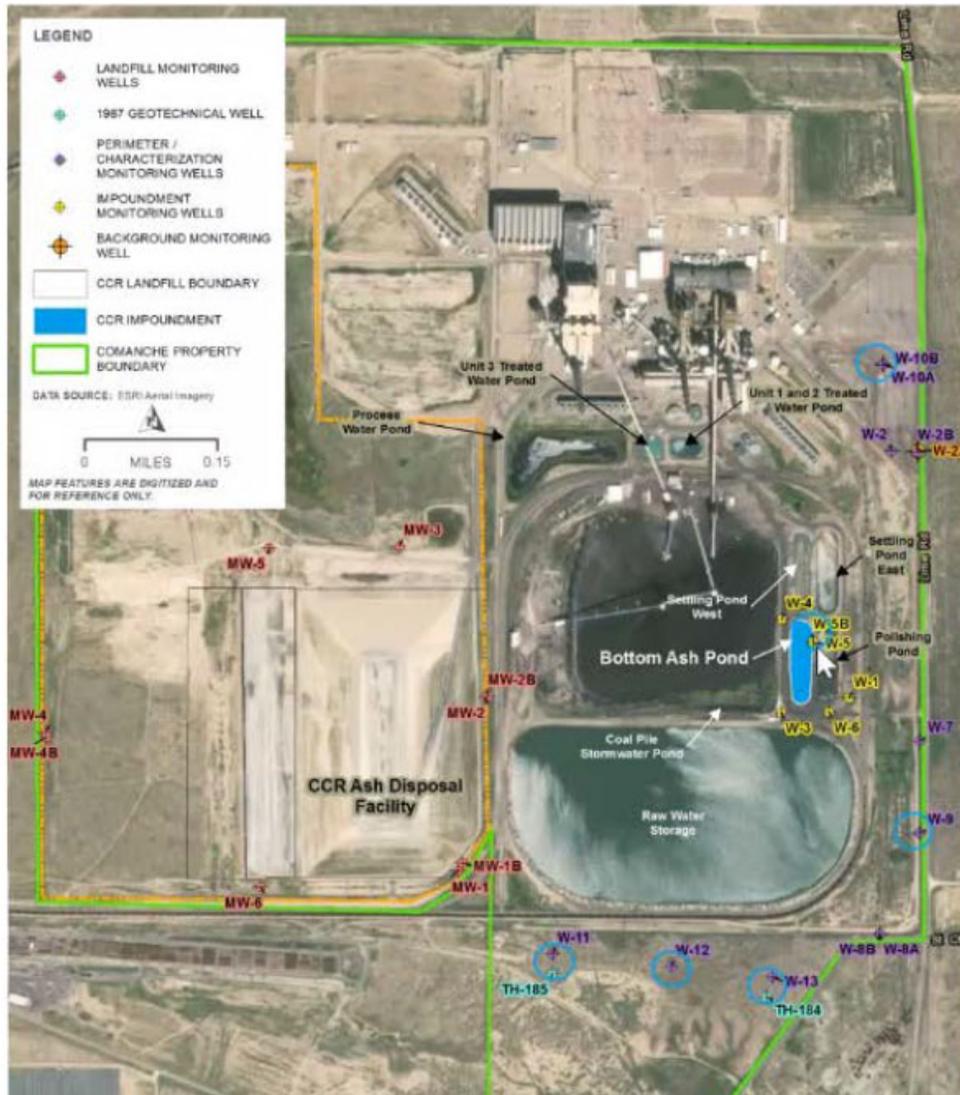


Comanche Station
Bottom Ash Treatment System Discussion
March 18-19, 2021





HDR, Inc.
2701 S Meridian Blvd, Suite 400
Englewood, CO 80112

CLIENT Xcel Energy

PROJECT NUMBER 10217175

Preliminary

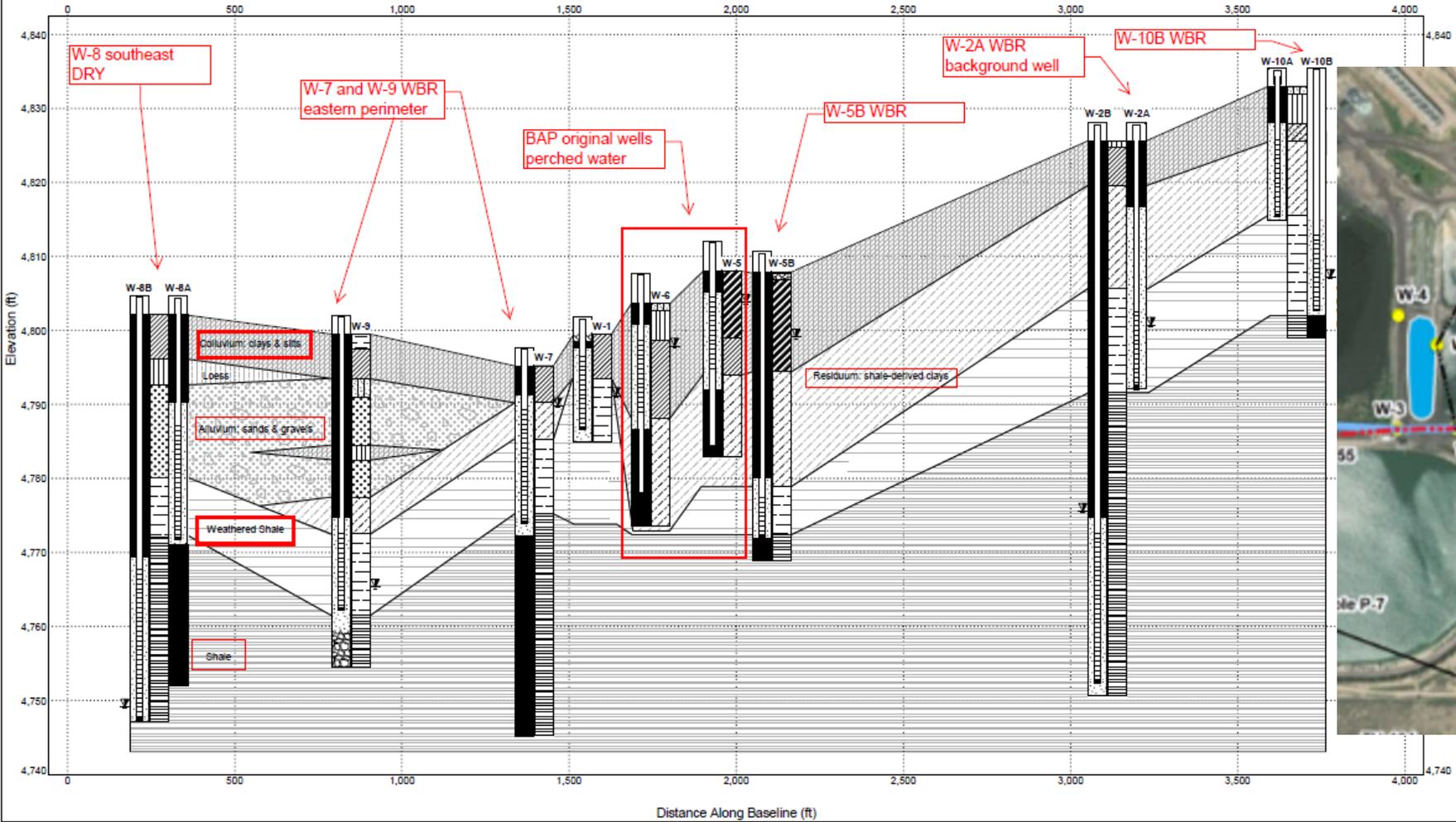
D --- D'
South - North

SUBSURFACE DIAGRAM

PROJECT NAME Comanche Station

PROJECT LOCATION Pueblo, CO

	USCS Low Plasticity Clay		Weathered Shale		USCS Silt
	Residuum: shale-derived clays		Shale		USCS High Plasticity Clay
	Asphalt		USCS Clayey Gravel		USCS Silty Sand
	USCS Well-graded Sand		USCS Low Plasticity Organic silt or clay		USCS Clayey Sand





HDR, Inc.
2711 S Meridian Blvd, Suite 400
Englewood, CO 80112

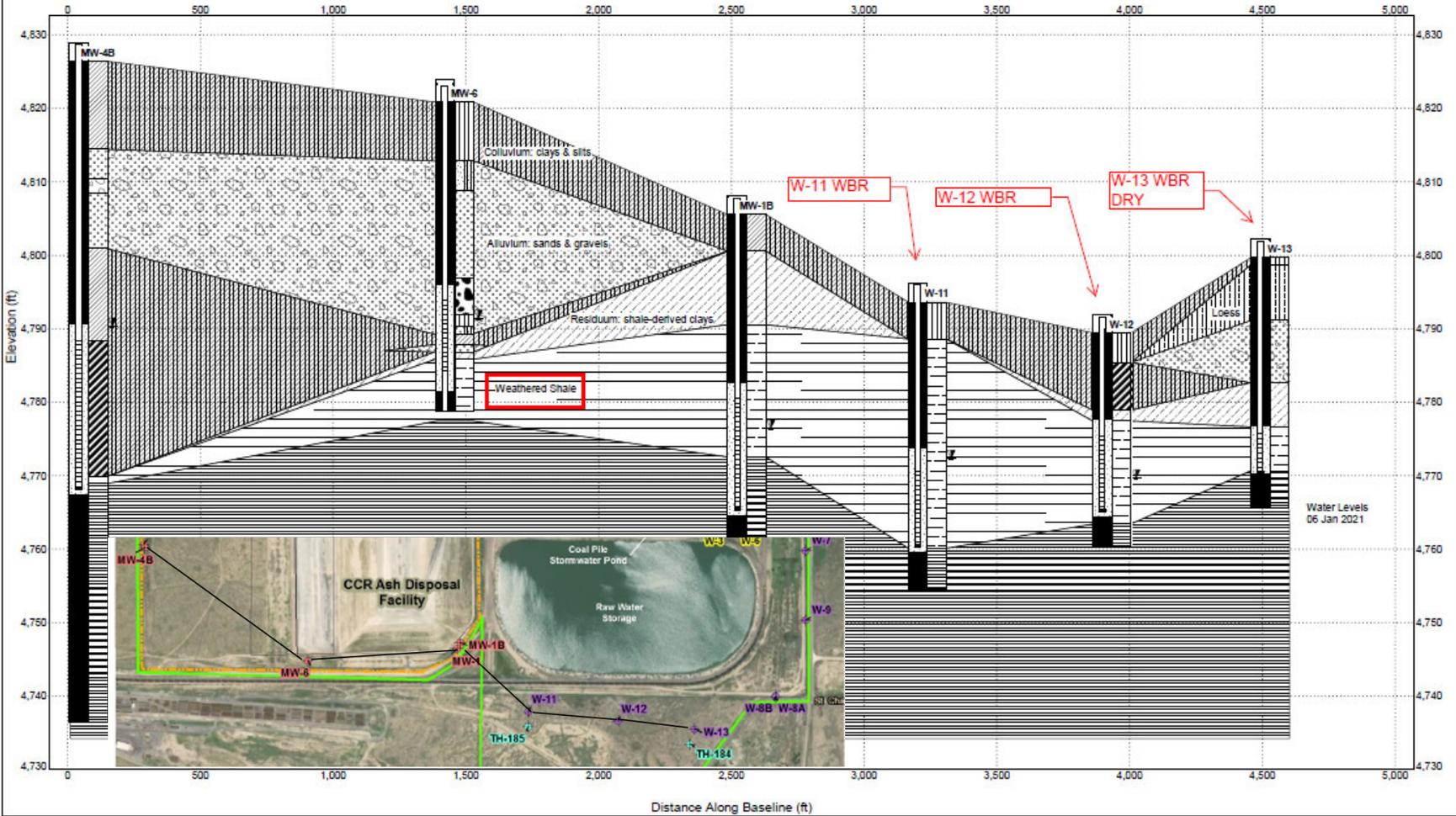
Preliminary

C --- C'
West - East

SUBSURFACE DIAGRAM

CLIENT Xcel Energy
PROJECT NUMBER 10217175

PROJECT NAME Comanche Station
PROJECT LOCATION Pueblo, CO

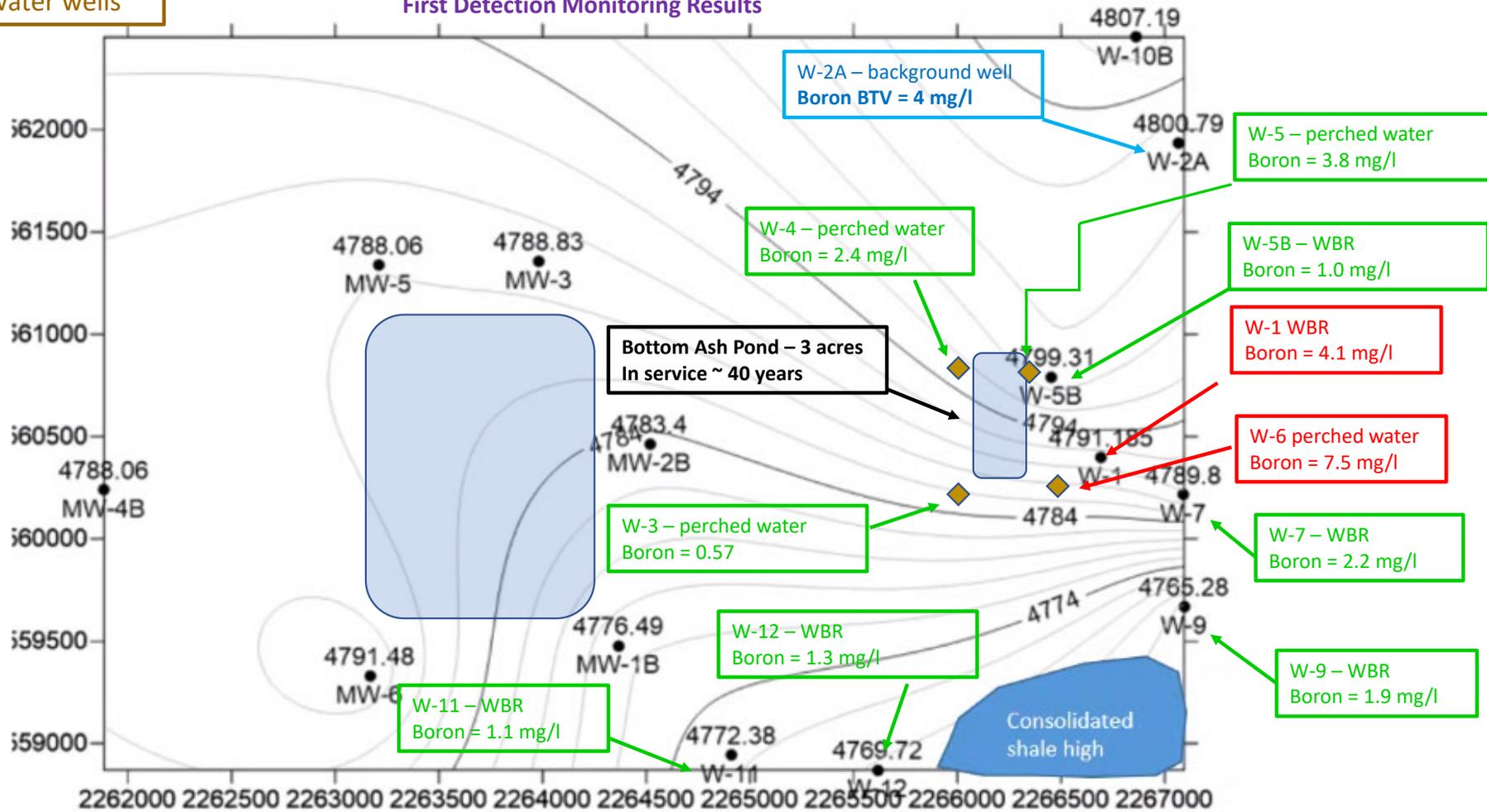
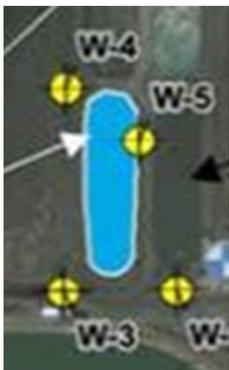


Groundwater Monitoring Issues/Questions

- Updated table and/or plots with all data collected to date
 - Export from database available
 - More user-friendly table in progress
- Has a statistical method been identified for SSIs?
 - Yes – Upper Prediction Limit (UPL)
- BTVs established and/or SSI evaluation completed?
 - Bottom ash pond
 - W-2A background well BTVs calculated
 - SSI for boron in two shallow adjacent colluvial wells
 - No boron SSIs in downgradient/property boundary wells
 - pH SSIs in multiple wells; parameter not unique to bottom ash
 - Landfill
 - MW-3 and MW-5 background data pooled, BTVs calculated
 - No SSIs in downgradient wells
 - 2 SSIs in cross-gradient wells completed in different geologic unit

January 2021 GW contours, weathered bedrock wells only
 First Detection Monitoring Results

Perched water wells



Upper Prediction Limits for Detection Monitoring for each Appendix III Constituent in Comanche Pond

W-2A as background Well

Type	Constituent	Unit	n	BTV ^a	January 12-14, 2021 DM Sample Event									
					W-3	W-5	W-5B	W-6	W-4	W-1	W-7	W-9	W-11	W-12
Appendix II	Boron	mg/l	8	4.00	0.57	3.8	1	7.5	2.4	4.1	2.2	1.9	1.1	1.3
Appendix II	Calcium	mg/l	8	657	300	200	480	210	420	420	440	380	370	160
Appendix II	Chloride (as)	mg/l	8	897	23	560	110	180	480	760	770	360	350	870
Appendix II	Fluoride	mg/l	8	578	0.68	<0.5	<0.5	1.7	4.4	3.1	<0.5	<0.5	2.7	<0.5
Appendix II	pH (field) (l su)		8	6.22	7.74	7.26	7.07	7.36	7.68	7.37	6.61	6.87	6.89	6.83
Appendix II	pH (field) (l su)		8	6.73	7.74	7.26	7.07	7.36	7.68	7.37	6.61	6.87	6.89	6.83
Appendix II	Sulfate (as)	mg/l	8	86,791	1300	13000	3600	4800	29000	29000	48000	11000	14000	16000
Appendix II	Total Disso	mg/l	8	202,620	2000	16000	5300	6200	NA	42000	69000	16000	20000	23000

Upper Prediction Limits for Detection Monitoring for each Appendix III Constituent in Comanche Pond (based on background wells MW-3 and MW-5)																	
Constituent	Unit	n	No. Below MDL	% Below MDL	ProUCL's Best Fit ²	HDR's Recommendations			Notes	January 12-14, 2021 DM Sample Event							
						Per-Test PPR (α) ¹	No. of Verification Samples	GTV ⁴		MW-1B	MW-2B	MW-3	MW-4B	MW-5	MW-6	W-11	W-12
Boron	mg/l	18	0	0%	al; Normal	0.0016	0	6.65		1.5	2.1	2.2	0.49	1.3	2.1	1.1	1.3
Calcium	mg/l	18	0	0%	parametric	0.0001	2	470		120	150	160	510	210	430	370	160
Chloride (a)	mg/l	18	0	0%	parametric	0.0001	2	1,800		410	580	360	200	1600	260	350	870
Fluoride	mg/l	18	5	28%	na; Normal	0.0016	0	444		1.8	1.3	<0.5	0.17	<0.5	0.25	2.7	<0.5
pH (field) (l.s.u)		18	0	0%	al; Normal	0.0016	0	6.32 (*)		6.77	6.81	6.94	6.82	6.9	7.42	6.89	6.83
pH (field) (l.s.u)		18	0	0%	al; Normal	0.0016	0	7.35 (*)		6.77	6.81	6.94	6.82	6.9	7.42	6.89	6.83
Sulfate (a.s)	mg/l	18	0	0%	parametric	0.0001	2	42,000		19000	37000	36000	3000	18000	4200	14000	16000
Total Dissolved	mg/l	18	0	0%	Lognormal	0.0016	0	200,778		25000	44000	51000	5900	24000	6100	20000	23000

Plan/schedule to locate and sample downgradient domestic wells



Permit No	Owner	Sect	QtrQtr	Type	Yield (gpm)	Year	Total Depth	Perforated	Lith above Screen	Lith in Screen	Depth to water
32703	Walter Davis	29	SESW	Domestic	15	1967	72	47-72	0-53 clay;	53-68 rocks and boulders; 68-70 blue clay; 70-75 blue shale	46
299364	SCANIO FAMILY LTD	29	W1/2	Domestic	15	2015	Alluvial 70	26-46	0-26 earth and	26-46 sand and gravel (large rock); 42-46 blue shale	38
148074	Mark and Debbie Thalhammer	28	NENW	Domestic	15	1987	34	24-34	0-20 yellow cl	20-30 Sand and Gravel; 30-34 Blue Shale	19

Plans and timing regarding locating and sampling downgradient domestic wells

- Phased step out approach
 - CCR Rule and technically appropriate
- wells installed in 2020
 - 6 south and east of pond
 - 2 dry, 4 sampled
 - Limited impact in shallow colluvial groundwater adjacent to pond
 - Concentrations less than background in downgradient wells at property line
- Nature and extent is bounded
- Cross-sections from the CCR units to the St. Charles River (N-S)?

Impacts of continued use of pond?

- Anticipate no additional impacts to groundwater
- Pond is 3 acres and has been in service for over 40 years
- Impacts localized in two adjacent shallow wells in colluvium
- No boron SSIs further downgradient of the pond and at property line
- Additional weeks of operation would not exacerbate
- How/when would Xcel model this?
 - Results don't suggest it is needed
 - Recommend we continue to follow the steps of the CCR Rule
 - Mathematical hydrogeologic model would take considerable time

Tracking bottom ash quantities

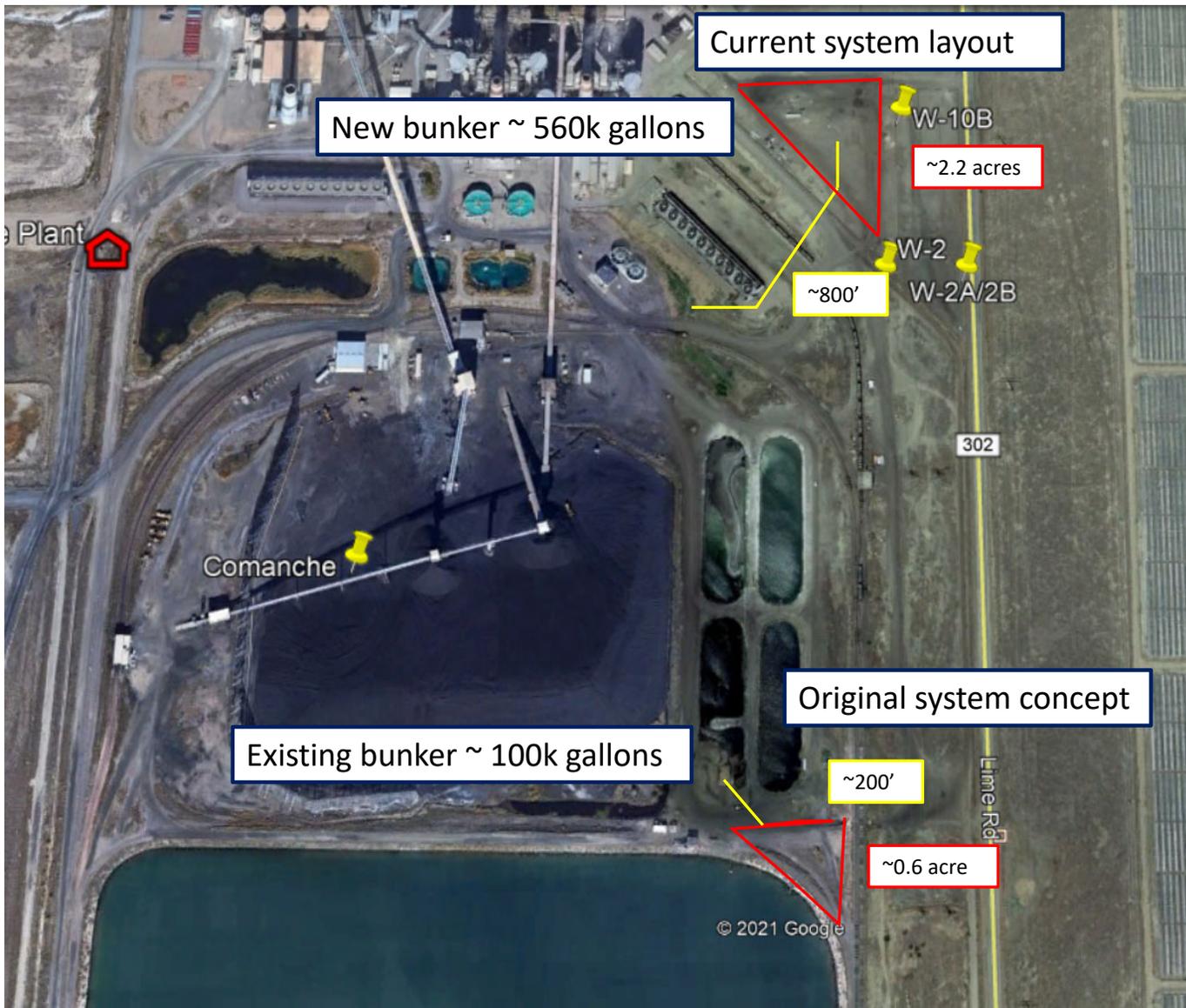
- Bunker
 - 5 days/week
- South ~ 1/3 pond area
 - Monthly
- North ~ 2/3 pond area
 - Annually
 - Mostly silt and vegetation



Groundwater Evaluation Summary

- First detection monitoring results evaluated
- BTVs calculated as Upper Prediction Limit (UPL)
 - SSIs for boron in two shallow colluvial wells adjacent to pond
 - Impacts at pond localized; boron in downgradient wells less than BTV
 - No SSIs in down-gradient wells at landfill
- Nature and extent limited
- No additional impacts from pond anticipated
- Results support no potential impact to off-site wells

Bottom Ash Treatment System Update



Temporary and pre-packaged systems status

- Temporary
 - Major equipment on site this week
 - Total Clean tank, conveyors, 16 clarifiers, 8 clear wells, 2 bag filter trailers
 - Underflow thickener, dewatering tanks, chemical feed skids, buildings, piping
 - Construction/installation
 - Excavations complete, rebar/concrete in progress, foundations, pads, etc.
 - Boring under rail complete; HDPE pipe welding on site
 - Hydroveyors in plant – to be installed
- Prepackaged
 - All components on site mid-May
 - 3 weeks to install, test, commission
 - Operation date contingent on completion of site prep/construction work
 - No contingency in schedule

Possible Administrative Order on Consent

Does any entity other than Public Service Company of Colorado (PSCo)

- own Comanche Station units 1 and 2? No
- operate Comanche Station units 1 and 2? No
- own the bottom ash impoundment? No

Does any entity other than Public Service Company of Colorado operate the bottom ash impoundment?

- PSCo is the sole operator of bottom ash discharges from the plant to the pond
- PSCo is also the sole entity in control of when bottom ash discharges to the pond will cease
- A PSCo contractor maintains the pond by regularly removing bottom ash from the bunker/pond system